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ORIGINAL ARTICLE

Prevalence, reasons and factors associated with intentional nonadherence to prescribed medications: a population-based study

Prevalência, motivos e fatores associados à não adesão intencional à terapia medicamentosa: um estudo de base populacional

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ABSTRACT

Objective: To evaluate the frequency, reasons and factors associated with intentional nonadherence to drug therapy. **Methods:** A population-based cross-sectional study was conducted with data from the National Survey on Access, Use and Promotion of Rational Use of Medicines (PNAUM). The questionnaire consisted of sociodemographic questions, presence of chronic diseases, medication use, self-rated health, and medication use behaviors. Data analysis included Poisson regression models adjusted for variance. **Results:** A total of 31,573 individuals were included, most of whom were women (53.8%), with low level of education (57.7%), and self-rated good health (56.5%). Of those interviewed, 8.8% reported increasing the medication dose and 21.2% reported reducing it. The most common reason for dose reduction was the adverse effects of the medication. There were no differences in the reasons for increasing doses. Increasing or reducing doses were most commonly reported by younger people, with lower *per capita* income and worse self-rated health. **Conclusion:** A considerable portion of the respondents did not intentionally adhere to drug therapy. Understanding nonadherence and identifying those who practice it is crucial for creating effective strategies that promote adherence to treatment and prioritize patients' needs and perspectives.

Keywords: Medication adherence. Health behavior. Patient compliance. Drug administration schedule.

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INTRODUCTION

Medication nonadherence refers to differences between the guidance provided by the healthcare professional regarding treatment and the patients' attitudes. Medication nonadherence is a global and multifactorial issue[1,2]. Although strategies have been developed to minimize it[3], it still poses a challenge in clinical practice[4].

Medication nonadherence can be categorized as intentional and unintentional. The first occurs when the patient consciously decides not to adhere to the instructions of the medication regimen proposed by the doctor, in order to change the prescribed dose or interrupt the treatment, for example. Intentional nonadherence to drug therapy by the patient is related to motivations and beliefs about their illness and treatment[5,6], and may reflect an individual's empowering behavior[7]. Unintentional nonadherence to drug therapy is related to passive behavior that is often beyond the patient's control such as accidentally taking the wrong number of pills or not understanding the information provided about the treatment[5].

Unintentional nonadherence to drug therapy can be minimized with health education actions such as using reminders to take the medication and providing instructions to patients in plain language. Conversely, strategies for intentional nonadherence to drug therapy are more complex, as they are related to the patients' behavior, expectations, and beliefs, aspects that may not be identified by the healthcare professional[8].

Thus, identifying the occurrence and factors that influence intentional nonadherence to drug therapy by patients can contribute to the development of strategies to improve the actions of professionals involved in prescribing and dispensing medications, and thus increase the chances of therapeutic success. Hence, the objective of this study was to evaluate the prevalence, reasons and factors associated with intentional nonadherence to prescribed medications in the Brazilian population.

METHODS

The data analyzed in this study were retrieved from the National Survey on Access, Use and Promotion of Rational Use of Medicines (*Pesquisa Nacional sobre Acesso, Utilização e Promoção do Uso Racional de Medicamentos* – PNAUM), a cross-sectional population-based study carried out in 245 Brazilian municipalities located in the five regions of the country (North, Northeast, Southeast, South, and Midwest) between the months of September 2013 and January 2014. The PNAUM sample was probabilistic in three stages, in which the primary sampling unit corresponds to municipalities; the second stage to census tracts (as defined by the 2010 Brazilian Census, carried out by the Brazilian Institute of Geography and Statistics – IBGE); and the third, to households. Details on sample calculation, sampling, research instruments, and field operational aspects can be found in the PNAUM methodological article[9].

Individuals aged 20 years or over who agreed to participate in the research were included in this analysis. The employed data collection strategy was face-to-face interviews, carried out by 165 trained interviewers and using electronic devices equipped with GPS and Internet access. The data used in this analysis included sociodemographic questions, presence of chronic diseases at the time of the interview, self-rated health, and behaviors in the use of medication. The behaviors in the use of medications analyzed were the intentional increase and reduction in the doses of prescribed medications, each of these classified based on questions addressing different possible situations:

1. Intentional increase in the doses of prescribed medications in the following situations: "Do you increase the dose of the medication prescribed by the doctor... (a) when you want to start a more intense treatment? (b) when you feel that you are not getting better? (c) when you feel that you are getting worse?";
2. Intentional reduction in the doses of prescribed medications in the following situations: "Do you reduce the dose of the medication prescribed by the doctor... (a) when you think the disease is under control? (b) when you think the medication is harmful to you? (c) when you want the medication to last longer? (d) when the medication is too expensive?"

The response options for the above questions were "yes"; "no"; or "reported that they do not increase the dose of the medication prescribed by the doctor without consulting the doctor" and "reported that they do not reduce the dose of the medication prescribed by the doctor without consulting the doctor," respectively.

To investigate and understand these behaviors related to medication use, two variance-adjusted Poisson regression models were constructed. The dependent variables of each model were increased or reduced doses. These two dichotomous derived variables were constructed from the responses to the previously mentioned questions. Thus, taking the increase in doses as an example, if the interviewees answered "yes" to at least one of the questions, they were categorized as "yes" for the increase in doses variable. In turn, respondents who stated that they did not increase doses or who answered "no" to all questions were categorized as "no" for the increase in doses variable. This same logic was used to derive the dependent variable reduction in doses. The independent variables tested were: sex, age group, marital status, level of education, *per capita* income, self-rated health, and presence of chronic disease.

The variables were analyzed individually in the first stage of the model construction. Those that presented statistical significance, defined as $p<0.2$, were included in the multivariable model. Variables with statistical significance greater than 0.05 at this stage were removed one by one

from the model until only those with statistical significance lower than 0.05 remained, assessed by the Wald test.

In descriptive analyses, categorical variables were represented by relative frequencies followed by their respective 95% confidence intervals (CI). The relative frequencies presented were weighted by the sampling weights. The results of the Poisson regression analyses were presented using Prevalence Ratios (PR) followed by their 95% confidence intervals. All analyses were performed using IBM PAWS Statistics version 18 and STATA version 13. Sample expansion and complex sampling plan were considered in all performed analyses.

The project was approved by the National Research Ethics Committee of the National Health Council under protocol 18947013.6.0000.0008. All participants signed the informed consent form before participating in the interview.

RESULTS

The analyzed data corresponded to 31,289 individuals aged 20 years or over who answered the questionnaire for the main outcome variables.

In Table 1 we present the main sociodemographic and economic characteristics, as well as the health profile, of

Table 1. Sociodemographic and economic characteristics, health information, and prevalence of reasons that lead to increased and reduced doses of prescribed medications on the patients' own behalf in the population studied by PNAUM. Brazil, 2014.

Characteristic	Prevalence* (%)	95%CI
Sex		
Men	46.2	45.1–47.3
Women	53.8	52.7–54.9
Age group (complete years)		
20 to 29	23.8	22.5–25.1
30 to 39	21.9	20.8–23.1
40 to 49	19.8	18.8–20.8
50 to 59	16.4	15.6–17.2
60 to 69	9.8	9.3–10.4
≥70	8.3	7.7–8.9
Marital status		
Lives with a partner	61.5	60.2–62.8
Does not live with a partner, but has lived with someone before	20.3	19.4–21.3
Has never lived with a partner	18.2	16.9–19.5
Level of education (completed years of study)		
0 to 8	57.7	56.0–59.3
9 to 11	31.0	29.7–32.3
≥12	11.3	10.3–12.4
Per capita income (quartiles)		
≥USD 300.00	34.5	31.9–37.2
USD 200.01 to USD 300.00	20.8	19.5–22.2
USD 100.01 to USD 200.00	27.0	25.3–28.8
≤USD 100.00	17.7	15.8–19.8
Self-rated health		
Very good	18.1	16.7–19.5
Good	56.5	55.2–57.7
Fair	22.1	20.8–23.4
Very poor/poor	3.4	3.0–3.7
Presence of chronic disease	39.1	37.8–40.5
Increase in prescribed doses	8.8	7.9–9.8
When you want to enhance the start of treatment	10.0	9.0–11.1
When you feel that you are not getting better	12.1	10.9–13.4
When you feel that you are getting worse	10.3	9.2–11.5
Reduction in prescribed doses	21.2	19.4–23.1
When you feel that the disease is under control	24.2	22.4–26.0
When you attribute an adverse effect to the medication	35.4	33.0–37.9
When you want to increase the time you take the medication	6.5	5.6–7.5
When you want to save on medication for financial reasons	7.0	6.1–8.0

*n: 117.761.37431.289. Percentages weighted by sample weights.

the analyzed sample. There was a predominance of women, young people (20 to 29 years old), those living with a partner, with low levels of education (0 to 8 years of study), and *per capita* income ≥USD 300.00. Regarding health statuses, 39.1% of individuals had some chronic disease and three quarters of those interviewed rated their health as good or very good.

The prevalence of increased and reduced doses of prescribed medications and the reasons are presented in Table 1. Of those interviewed, 8.8% reported increasing the dose of prescribed medication in some situation and 21.2% reduced the dose. The most frequent reason for reducing doses was adverse effects associated with the medication, while lack of improvement was the most frequently reported reason for increasing the dose. However, we observed no statistically significant differences for the other reported reasons for increasing doses.

In Table 2 we present the prevalence values of increased and reduced doses of prescribed medications, according to sociodemographic and economic characteristics and health profile. It should be noted that both the increase and reduction in doses were most frequently reported by younger people, with lower *per capita* income, and worse self-rated health.

The crude and adjusted PRs for increase in dose and their respective 95% confidence intervals are presented in Table 3. In the adjusted model, the associations between younger individuals, with lower *per capita* income and worse self-rated health, remained positively associated with increased doses, with statistically significant differences. The prevalence of increase in dose among respondents aged 20 to 29 years was 2.6 times the prevalence of increase among older adults aged 70 years or older.

Table 2. Prevalence values for increased and reduced doses, on the patients' own behalf, of prescribed medications among the surveyed adult population, according to sociodemographic and economic characteristics and health profile. PNAUM, Brazil, 2014.

Characteristic	Prevalence* (%)	95%CI	p-value†	Prevalence* (%)	95%CI	p-value†
	Increase in doses			Reduction in doses		
Sex						
Men	8.9	7.7–10.4	0.705	19.9	17.8–22.2	0.005
Women	8.7	7.9–9.7		22.3	20.5–24.2	
Age group						
20 to 29	11.6	9.8–13.6	<0.001	24.7	21.9–27.9	<0.001
30 to 39	10.9	9.3–12.7		25.1	22.6–27.9	
40 to 49	7.5	6.5–8.7		19.5	17.3–21.8	
50 to 59	7.2	6.1–8.5		18.2	16.4–20.1	
60 to 69	6.0	5.1–7.0		17.8	16.0–19.8	
≥70	5.2	4.0–6.8		14.7	12.6–17.1	
Marital status						
Lives with a partner	8.9	7.9–9.8	0.174	22.3	20.4–24.4	0.373
Does not live with a partner, but has lived with someone before	9.1	7.8–10.6		21.1	19.0–23.3	
Has never lived with a partner	10.6	8.5–13.2		23.3	19.8–27.1	
Level of education (completed years)						
0 to 8	9.1	8.0–10.3	0.386	21.4	19.4–23.6	0.661
9 to 11	8.4	7.3–9.6		20.7	18.7–22.8	
≥12	8.5	7.0–10.2		21.9	18.8–25.3	
Per capita income						
≥USD 300.00	8.4	6.8–10.4	<0.001	21.7	18.9–24.8	<0.001
USD 200.01 to USD 300.00	8.5	7.0–10.4		21.3	18.8–24.1	
USD 100.01 to USD 200.00	11.2	9.2–13.5		27.8	25.1–30.6	
≤USD 100.00	14.7	12.6–17.2		31.5	27.9–35.3	
Self-rated health						
Very good	7.3	6.0–8.8	<0.001	18.2	15.4–21.4	<0.001
Good	8.0	6.9–9.3		19.5	17.6–21.5	
Fair	11.4	10.0–13.0		27.2	24.7–29.7	
Poor/very poor	13.3	10.5–16.6		27.0	23.1–31.3	
Presence of chronic disease						
No	9.0	8.0–10.1	0.473	20.7	18.8–22.7	0.091
Yes	8.6	7.6–9.7		22.1	20.1–24.2	

[a] Percentages weighted by sample weights; †Pearson's χ^2 test.

Table 3. Crude and adjusted prevalence ratios for increased doses, on the patients' own behalf, of prescribed medications in the adult population surveyed by PNAUM. PNAUM, Brazil, 2014.

Characteristic	Crude PR*	95%CI	p-value	Adjusted PR*	95%CI	p-value
Sex						
Men	1	–	0.705			
Women	0.97	0.84–1.12				
Age group						
20 to 29	2.22	1.65–3.00	<0.001	2.61	1.78–3.84	<0.001
30 to 39	2.08	1.65–2.64		2.29	1.67–3.15	
40 to 49	1.44	1.07–1.93		1.56	1.06–2.28	
50 to 59	1.38	1.02–1.88		1.57	1.06–2.32	
60 to 69	1.14	0.87–1.50		1.19	0.86–1.66	
≥70	1	–		1	–	
Marital status						
Lives with a partner	1	–	0.176			
Does not live with a partner, but has lived with someone before	1.02	0.87–1.21				
Has never lived with a partner	1.20	0.98–1.45				
Level of education (completed years)						
0 to 8	1	–	0.389			
9 to 11	0.92	0.81–1.05				
≥12	0.93	0.77–1.11				
Per capita income						
≥USD 300.00	1	–	<0.001	1	–	0.008
USD 200.01 to USD 300.00	1.02	0.77–1.34		0.99	0.75–1.31	
USD 100.01 to USD 200.00	1.33	1.02–1.74		1.21	0.93–1.58	
≤USD 100.00	1.75	1.37–2.24		1.45	1.13–1.86	
Self-rated health						
Very good	1	–	<0.001	1	–	0.003
Good	1.10	0.89–1.35		1.14	0.87–1.49	
Fair	1.57	1.27–1.93		1.52	1.17–1.97	
Poor/very poor	1.82	1.39–2.37		1.53	1.05–2.22	
Presence of chronic disease						
No	1	–	0.473			
Yes	0.96	0.85–1.08				

*Poisson regression with robust variance adjustment.

In Table 4 we present the crude PRs and those adjusted for reduction in doses. Similarly to what was observed for the increase in doses, the associations between younger individuals, with lower *per capita* income, and worse self-rated health, remained positively associated with the reduction in doses, in the adjusted model, with statistically significant differences.

DISCUSSION

Considering a population-based sample, we assessed intentional changes in prescribed doses, one of the aspects of medication nonadherence. Approximately one in five respondents reduced their prescribed medication doses and one in 10 increased their doses. Overall, younger individuals, with lower income, and worse self-rated health, most frequently reported intentional nonadherence to drug therapy.

The main reason given for reducing the dose was the perception that the medication was causing adverse effects. These findings are similar to those found in other studies, especially regarding patient's concern about possible undesirable effects from medication use[7,10,11]. Some researchers have shown that patients who are more concerned about the adverse effects of medications[12,13] and with established beliefs that medications in general are harmful are more likely to report intentional nonadherence to drug therapy[11,14]. Clifford et al. identified that patients who intentionally do not adhere to drug therapy are more likely to doubt the need for treatment and have concerns about medication use[5].

Horne et al. propose that a patient's decision to intentionally adhere or not to drug therapy results from a cost-benefit assessment, in which personal beliefs about the need for the drug to maintain or improve health are balanced against concerns about potential adverse effects[13]. According to the

Table 4. Crude and adjusted prevalence ratios for reduced doses, on the patients' own behalf, of prescribed medications in the adult population surveyed by PNAUM. PNAUM, Brazil, 2014.

Characteristic	Crude PR*	95%CI	p-value	Adjusted PR*	95%CI	p-value
Sex						
Men	1	–	0.005			
Women	1.12	1.03–1.21				
Age group						
20 to 29	1.68	1.45–1.94	<0.001	2.07	1.72–2.50	<0.001
30 to 39	1.71	1.49–1.96		1.86	1.55–2.23	
40 to 49	1.32	1.15–1.52		1.44	1.20–1.72	
50 to 59	1.24	1.07–1.42		1.29	1.08–1.54	
60 to 69	1.21	1.04–1.40		1.26	1.06–1.50	
≥70	1	–		1	–	
Marital status						
Lives with a partner	1	–	0.396			
Does not live with a partner, but has lived with someone before	0.94	0.85–1.04				
Has never lived with a partner	1.04	0.92–1.18				
Level of education (completed years)						
0 to 8	1	–	0.596			
9 to 11	0.96	0.89–1.04				
≥12	1.02	0.87–1.19				
Per capita income						
≥USD 300.00	1	–	<0.001	1	–	<0.001
USD 200.01 to USD 300.00	0.98	0.83–1.16		0.96	0.81–1.14	
USD 100.01 to USD 200.00	1.28	1.10–1.49		1.19	1.03–1.37	
≤USD 100.00	1.45	1.23–1.71		1.25	1.06–1.46	
Self-rated health						
Very good	1	–	<0.001	1	–	<0.001
Good	1.07	0.93–1.24		1.17	0.98–1.41	
Fair	1.49	1.26–1.76		1.47	1.20–1.80	
Poor/very poor	1.48	1.22–1.81		1.55	1.21–1.97	
Presence of chronic disease						
No	1	–	0.091			
Yes	1.07	0.99–1.15				

*Poisson regression with robust variance adjustment.

reasons we identified in our study for increasing the prescribed doses, the users understand that the medication is necessary for their health. Conversely, among the reasons for reducing doses, we identified three distinct aspects. The assessment that the disease is under control, or the absence of symptoms, as occurs in some chronic diseases, can reinforce the belief that the medication is no longer necessary, at least in the prescribed quantity, causing the patient to reduce the doses. Concern about adverse effects, in turn, the reason most cited by the respondents, is in line with the theory proposed by Horne et al.[13]. Even if proportionally less frequent, the reduction in doses to increase the duration of use or for financial reasons suggests that issues of access to medication are present in both unintentional and intentional nonadherence to drug therapy.

In the present study, we observed a higher prevalence of the younger population in intentionally not adhering to drug therapy, which corroborates findings from other studies[11,14,15]. This difference can be explained by the different expectations of illness and use of medication between young and old people as well as different behaviors in relation to taking care of their health.

Regarding self-rated health, it was expected that individuals with a worse perception of their health would have a higher prevalence of intentional nonadherence to drug therapy. We can consider that worse health conditions lead to changes in treatment made by patients themselves, with or without prior support or guidance from healthcare professionals. This movement raises reflections on the necessary advances in relation to the new paradigm of care for chronic diseases, which involves professional-patient partnership, collaborative care, and education for self-management in the care of chronic diseases[16,17]. According to this model, patients are included in decision-making about their health, working in collaboration with healthcare professionals who, in this case, assume an important role as

supervisors and reliable sources of information. Instead of unsupervised dose changes that are subject to therapeutic failures and risks to the patient, some initiatives are beginning to emerge to promote dose adjustments based on the monitoring of signs and symptoms by the very patients[18].

In our study, the level of education variable did not show a positive association with the increase or reduction in doses. One explanation for this finding may lie in the very concept of intentional and unintentional nonadherence to drug therapy. Understanding health information is related to the level of education and, therefore, the consequent nonadherence to medication, in this case, is not a purposeful action carried out by the patient, but rather something that is beyond their control, not presenting itself as an intentional nonadherence to drug therapy. Likewise, patients with chronic diseases may change their treatment more intuitively, showing behavior that is not perceived by the patients themselves and, therefore, not reported when answering the questionnaire.

The habit of taking medication, that is, the patient's unconscious routine of using their medication, may prove to be a strong predictor of unintentional nonadherence to drug therapy and unrelated to intentional nonadherence to drug therapy[19]. Marital status, in turn, did not establish a relationship with the rate of medication nonadherence when assessed alone. Studies in which the marital status was evaluated linked to social support and the quality of support, and not just to mere coexistence with other people, may be more efficient in defining intentional nonadherence to drug therapy[20].

Intentional nonadherence to drug therapy by patients can become an invisible practice in treatment, as a result of the gap in the perception of healthcare professionals, and reinforced by patients' omission. A possible explanation for the latter refers to the widespread disapproval of this behavior in social circles, which leads to greater difficulty for the patient in communicating with the healthcare professional. Mutual collaboration between physician and patient and a more vigilant role of the healthcare professional may be factors contributing to reducing the risks of medication nonadherence and improving health outcomes[4].

Intentional nonadherence to drug therapy requires deeper knowledge of the patients' beliefs, attitudes, and perceptions, requiring awareness and demystification about the treatment. The intention to adhere depends on how patients understand their treatment and what their relationship with the medications is[21]. The analysis of behavior in relation to medications, from the dichotomous perspective of taking or not taking prescribed medications, may not fully encompass the understanding of the relationship that users establish with medications and prescriptions. Intentional nonadherence to drug therapy involves patients' beliefs and perspectives about their treatment, including their perceptions about strong and weak medications[22]. In addition to beliefs and perspectives, there is also experience accumulated over time. Behind the intentional nonadherence to drug therapy, the patient can use a rational logic that adjusts the doses to meet their priorities, applying what they have learned from previous experiences related to their body, their health, and treatments. These changes may be adequate, considering that this trial and error alternative is also used by the clinician, many times, when the response to treatment is not adequate.

Among the strengths of the present study, we highlight the comprehensive sample of the Brazilian population, including adults of all ages and not focused on a specific disease, thus contributing to the generalization of the findings. Although the topic of medication nonadherence is widely discussed in the literature, there is a gap in relation to intentional nonadherence to drug therapy, specifically, focusing on the main reasons and associated factors. Among the limitations, it is worth noting that approximately 60% of the sample did not have a chronic disease, although the studied phenomenon also applies to individuals who occasionally take medications to prevent or manage acute conditions. Secondly, it should be noted that the prevalence of intentional nonadherence to drug therapy may be underestimated, as changing treatment by patients without the prescriber's consent is not a generally accepted behavior. In this sense, due to the need to provide socially desirable responses, some respondents may have omitted the fact that they do not adhere to the treatment[8]. Finally, it is noteworthy that the data were collected 10 years ago, which may not fully reflect the current situation. During this period, the main factors responsible for alterations in doses may have changed. The frequency of reducing doses for financial reasons, for example, may have changed.

A considerable portion of respondents reported intentionally not adhering to drug therapy. The main reason for reducing doses was the perception of adverse effects, and for increasing doses, no differences were observed in the reported frequencies. Understanding the reasons for intentional nonadherence to drug therapy and who the individuals that practice it are is fundamental for proposing more effective measures to improve medication adherence, based on the patient's needs and perspectives.

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RESUMO

Objetivo: Avaliar a frequência, os motivos e fatores associados à não adesão intencional à terapia medicamentosa. **Métodos:** Foi conduzido um estudo transversal de base populacional com dados da Pesquisa Nacional sobre Acesso, Utilização e Promoção do Uso Racional de Medicamentos (PNAUM). O questionário foi composto por questões sociodemográficas, referentes à presença de doenças crônicas, uso de medicamentos, autoavaliação de saúde e comportamentos no uso de medicamentos. A análise dos dados incluiu modelos de regressão de Poisson ajustados para variância. **Resultados:** Foram incluídos 31.573 indivíduos, sendo a maioria do sexo feminino (53,8%), com baixa escolaridade (57,7%) e com autoavaliação de saúde boa (56,5%). Dos entrevistados, 8,8% relataram aumentar a dose dos medicamentos e 21,2% relataram diminuir. O motivo mais comum para a diminuição da dose foram os efeitos adversos do medicamento. Não houve diferenças para os motivos de aumento de doses. O aumento ou a diminuição de doses foi mais comumente reportado pelos mais jovens, com menor renda *per capita* e pior autoavaliação de saúde. **Conclusão:** Uma parcela considerável dos entrevistados não adere intencionalmente à terapia medicamentosa. Entender a não adesão medicamentosa e identificar quem a pratica é crucial para criar estratégias eficazes que promovam a adesão medicamentosa e priorizem as necessidades e perspectivas dos pacientes.

Palavras-chave: Adesão à medicação. Comportamentos relacionados com a saúde. Conformidade com o tratamento. Esquema de medicação.

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