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Legibility assessment of pictograms by medication users in southern Brazil

Avaliação da legibilidade de pictogramas por usuários de medicamentos no sul do brasil

Evaluación de la Legibilidad de Pictogramas por Usuarios de

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ABSTRACT

Objective: To develop and validate pictograms related to medication use in order to improve understanding and treatment adherence among users of the Brazilian Unified Health System (SUS) in a municipality in Southern Brazil. **Methods:** This was a descriptive study with both qualitative and quantitative approaches, conducted at a health unit in Formigueiro, Rio Grande do Sul, Brazil. Initially, focus groups were held with health professionals and SUS users to design the pictograms. Subsequently, 5 pictograms were selected and submitted to a legibility test involving 200 participants. A pictogram was considered legible if it was understood by ≥ 85% of respondents, in accordance with ISO 3864-1. **Results:** Of the 5 pictograms evaluated, 4 met the legibility criterion. The pictogram “Take 1 hour before breakfast or chimarrão” was the least understood (65%). Pictogram comprehension showed a statistically significant association with education level, occupation, and the number of daily medications used ($p<0.05$). **Conclusion:** Pictograms proved to be effective tools in aiding comprehension of medical prescriptions, especially when combined with verbal instructions. The use of simple, culturally appropriate images may support the rational use of medications within the SUS.

Descriptors: Pictograms; Rational use of medicines; Health.

RESUMO

Objetivo: *Desenvolver e validar pictogramas relacionados ao uso de medicamentos, visando facilitar a compreensão e a adesão ao tratamento por usuários do Sistema Único de Saúde (SUS) de um município do Sul do Brasil.* ***Métodos:*** *Estudo descritivo, com abordagem qualitativa e quantitativa, realizado em unidade de saúde de Formigueiro, Rio Grande do Sul, Brasil. Inicialmente, foram conduzidos grupos focais com profissionais de saúde e usuários do SUS para elaboração dos pictogramas. Posteriormente, cinco pictogramas foram selecionados e submetidos a teste de legibilidade com 200 participantes. Considerou-se como legível o pictograma compreendido por ≥ 85% dos entrevistados, conforme a norma ISO 3864-1.* ***Resultados:*** *Dos cinco pictogramas avaliados, quatro atingiram o critério de legibilidade. O pictograma “Tomar uma hora antes do café da manhã ou chimarrão” foi o menos compreendido (65%). A compreensão dos pictogramas apresentou associação estatisticamente significativa com escolaridade, ocupação e número de medicamentos de uso diário ($p<0,05$).* ***Conclusão:*** *Os pictogramas se mostraram ferramentas eficazes para auxiliar a compreensão da prescrição médica, sobretudo quando associados a orientações verbais. O uso de imagens simples e culturalmente adequadas pode contribuir para o uso racional de medicamentos no SUS.*

Descritores: *Pictogramas; Uso racional de medicamentos; Saúde.*

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RESUMEN

Objetivo: *Desarrollar y validar pictogramas relacionados con el uso de medicamentos, con el fin de facilitar la comprensión y la adhesión al tratamiento por parte de usuarios del Sistema Único de Salud (SUS) de un municipio del sur de Brasil.* ***Métodos:*** *Estudio descriptivo, con enfoque cualitativo y cuantitativo, realizado en una unidad de salud de Formigueiro-RS. Inicialmente, se llevaron a cabo grupos focales con profesionales de la salud y usuarios del SUS para la elaboración de los pictogramas. Posteriormente, se seleccionaron cinco pictogramas y se sometieron a prueba de legibilidad con 200 participantes. Se consideró legible el pictograma comprendido por ≥85% de los entrevistados, conforme a la norma ISO 3864-1.* ***Resultados:*** *De los cinco pictogramas evaluados, cuatro alcanzaron el criterio de legibilidad. El pictograma "Tomar una hora antes del desayuno o del mate" fue el menos comprendido (65%). La comprensión de los pictogramas presentó asociación estadísticamente significativa con la escolaridad, la ocupación y el número de medicamentos de uso diario (p<0,05).* ***Conclusión:*** *Los pictogramas se mostraron como herramientas eficaces para apoyar la comprensión de la prescripción médica, especialmente cuando se complementan con orientaciones verbales. El uso de imágenes simples y culturalmente adecuadas puede contribuir al uso racional de medicamentos en el SUS.*

Descriptores: *Pictogramas; Uso racional de medicamentos; Salud.*

INTRODUCTION

Approximately 40% of the adult Brazilian population has at least 1 noncommunicable chronic disease, with cardiovascular conditions, cancer, and diabetes mellitus being the most prevalent[1]. At the same time, the use of polypharmacy — defined as the concurrent use of 5 or more medications — is on the rise, with an estimated prevalence of 9.4% in the general population and 18.1% among individuals over 65 years of age[2]. The appropriate combination of medications can relieve symptoms, control diseases, and improve quality of life[2]. However, irrational drug use, underuse, or poor treatment adherence may lead to adverse reactions and drug interactions[2].

One of the main causes of non-adherence to treatment is the difficulty in understanding medical prescriptions, often due to illegible handwriting, disorganized information, or complex language[3]. Essential elements such as drug name, dosage, indications, and side effects must be presented clearly to prevent medication errors and minimize clinical, personal, and socioeconomic harms[3]. Furthermore, studies have shown a link between low educational attainment and poor adherence to pharmacological treatment[4].

Research highlights the "picture superiority effect," which refers to a cognitive preference for information conveyed through images rather than oral or written formats[5]. Pictograms — i.e., standardized graphic symbols — have been increasingly used as visual aids capable of conveying messages in a simple, clear, and direct manner[5].

Pictograms have emerged as promising tools for minimizing communication failures in health care, facilitating the interpretation and retention of information[6]. Therefore, the present study aimed to develop and validate pictograms related to medication use, with the goal of improving comprehension and treatment adherence among users of the Brazilian Unified Health System (SUS) in a city in Southern Brazil.

METHODS

This was a descriptive study with both qualitative and quantitative approaches, conducted at a health unit located in the city of Formigueiro, state of Rio Grande do Sul, Brazil. Formigueiro has an estimated population of approximately 7,000 inhabitants and is located in the central region of the state, featuring a basic health care network serving both rural and urban populations. The health unit in question provides an average of 2,680 consultations per month.

Participants included individuals aged 18 years or older, comprising health professionals and users of the SUS in the city. Participants were selected through consecutive and convenience sampling. Exclusion criteria included individuals with cognitive impairments that prevented them from understanding the pictograms, uncorrected visual impairments, or those who declined to sign the informed consent form. The study was conducted between October and November 2021 and involved 2 distinct methodological stages: the first focused on the development of pictograms, and the second on testing their legibility.

In the first stage, 2 focus groups were conducted — one with health professionals (n = 9) and another with SUS users (n = 6). The focus group method, as proposed by Kitzinger[7], involves group discussions aimed at exploring perceptions on a specific topic through participant interaction. During the sessions, participants were asked prompting questions such as: "If you had to create a drawing that conveyed the information (…), what would it look like?" The

question varied according to 5 predefined situations: “take the medication 1 hour before breakfast or chimarrão,” “take with lunch,” “take in the morning upon waking,” “take at night,” and “clock showing 4 o’clock.” These scenarios were based on the most commonly observed instructions in prescriptions and medication labels at the health unit.

Participant responses were audio-recorded, transcribed, and analyzed using the steps of Content Analysis proposed by Bardin[8]: pre-analysis, material exploration, and treatment of results. The most frequent and agreed-upon suggestions served as the basis for pictogram development.

The pictograms were created with technical support from the Center for Educational Technology (CTE) at the Universidade Federal de Santa Maria (UFSM). The CTE, part of the Office of Undergraduate Studies, specializes in the development of educational and technological resources and collaborates on teaching and learning projects across various modalities.

In the second stage, the pictograms underwent legibility testing. For this analysis, ISO 3864-1[9] was used as a reference, which considers a pictogram legible when at least 85% of users correctly interpret its meaning.

Sample size was calculated based on the estimated number of users who collect medications monthly at the Municipal Pharmacy (2,680 individuals). Assuming an expected prevalence of 85%, a 5% margin of error, 95% confidence level, and a 10% increase to account for potential losses, the required sample was estimated at 200 participants. Calculation was performed using EpiInfo® version 6.0.

Data collection took place at various times of day during October and November 2021. Participants completed a questionnaire consisting of 2 sections: the first covered sociodemographic variables, and the second presented the developed pictograms. Comprehension of each pictogram was assessed using the question: “If you had to take a medication and this figure represented the instructions, what would you understand it to mean?”

Data were organized in an electronic database using Microsoft Excel® and analyzed statistically with IBM SPSS Statistics for Windows, version 19 (IBM Corp., Armonk, N.Y., USA). Variables were expressed in absolute and relative frequencies. Associations between variables were analyzed using the chi-square test, adopting a 5% significance level and a 95% confidence interval.

Age groups were classified according to the World Health Organization (WHO), which categorizes adults as follows: young adults (15-30 years), middle-aged adults (31-45 years), late middle-aged adults (46-60 years), and older adults (over 60 years)[10].

The study followed the ethical principles outlined in Resolution No. 466 of December 12, 2012, of the Brazilian National Health Council. The research project was approved by the Research Ethics Committee at UFSM, under approval number 4.267.152 and CAAE number 20060719.6.0000.5346. All participants signed the informed consent form prior to interviews.

RESULTS

The focus group with health professionals included 6 women and 3 men: 4 nurses, 2 physicians, 1 physical therapist, 1 dentist, and 1 pharmacist. Their professional experience at the institution ranged from 1 to 10 years, with most working daytime shifts. Although the study was conducted at a primary health care unit, some of the professionals also worked in other municipal health services, indicating multiple employment ties within the local health care network.

Regarding service allocation, 2 professionals worked in the adult emergency room and clinical ward, 6 were affiliated with the primary health care unit, and 1 worked at the Municipal Pharmacy. The group of SUS users consisted of 6 women and 2 men.

After transcription of the focus group responses, the degree of agreement among participants was used as the primary criterion for defining the ideal composition of pictograms. The most frequently mentioned expressions and overlapping suggestions were systematized and guided the initial design of the pictograms (Table I).

Table I – Systematization of the contents to be included in pictograms. Formigueiro, Rio Grande do Sul, Brazil, 2021.

No.	Instruction	Figure composition – User perspective	Figure composition – Professional perspective
01	"Take the medication 1 hour before breakfast or chimarrão"	Coffee cup (refers to breakfast) with a time-related setting (sun rising); figure with full and empty stomach; arrows to indicate "before" and "after"; use of numbers to represent hours.	Coffee cup or chimarrão gourd (refers to breakfast) with a time-related setting (sunrise, indicating time of day); clock to represent hours.
02	"Take the medication 1 hour before dinner"	Plate of food (just the plate or a specific meal?); time indicators: day/night, morning/afternoon/night; arrows: before and after; night = moon.	Plate of food; use of clock to indicate time; night = moon; place elements at different levels to indicate before/after.
03	"Take the medication with lunch"	Same pictogram structure as above, replacing moon with sun; use of "+" to indicate "with"; utensils; figure next to plate with pill in mouth; figure + plate = take together; figure without plate = take at another time; avoid using sandwiches or cookies to prevent confusion with breakfast or snack.	Same structure as above, replacing moon with sun; pill next to meal = take with it.
04	"Take the medication with breakfast"	Coffee cup; drawing must not indicate a hot drink.	Sun – coffee – pill; pill next to meal = take with it.
05	"Take the medication in the morning, upon waking"	Figure sitting on bed in pajamas, with sun rising, rooster crowing to indicate "upon waking," alarm clock, and medication beside.	Figure sitting on bed stretching; sun rising; alarm clock with medication beside.
06	"Take the medication at night, before bed"	Same drawing as above, without "waking up" indicators; with moon; suggestion to change figure's gender/age to avoid confusion and draw attention to time difference.	Same drawing as above, without "waking up" indicators; moon – bed – pill.
07	"Take the medication in the morning"	Pill between a coffee cup and a plate of food; mix of previous 2 pictograms to indicate "after eating and before lunch"; left time undefined for individual adaptation.	Sun – M – pill; morning = sun; letter M to indicate morning.
08	"Take the medication at 11 a.m. and 4 p.m."	11 a.m.: numeral 11 + "before" arrows + lunch pictogram; 4 p.m.: afternoon image, sun setting, numeral; clock showing 4 p.m.; use "snack" instead of coffee cup.	Clock 11h + pill + M // Clock 16h + pill + T; M = morning shift; T = afternoon shift.

Source: Prepared by the authors.

Based on the systematization of data from the focus groups, 13 pictograms were created. Of these, 5 were selected by the researchers for the validation phase (Figure 1), based on the relevance and recurrence of the information conveyed. In the legibility survey, the sample consisted predominantly of women (65%), with the most represented age group being middle-aged adults (33.8%). Regarding education level, 40.5% had completed high school, and most participants reported a monthly income of 1-3 minimum wages (50%). Notably, 24.1% were professionals classified under Group 2 of the Brazilian Classification of Occupations, and 56% reported using 1-3 medications per day (Table II).

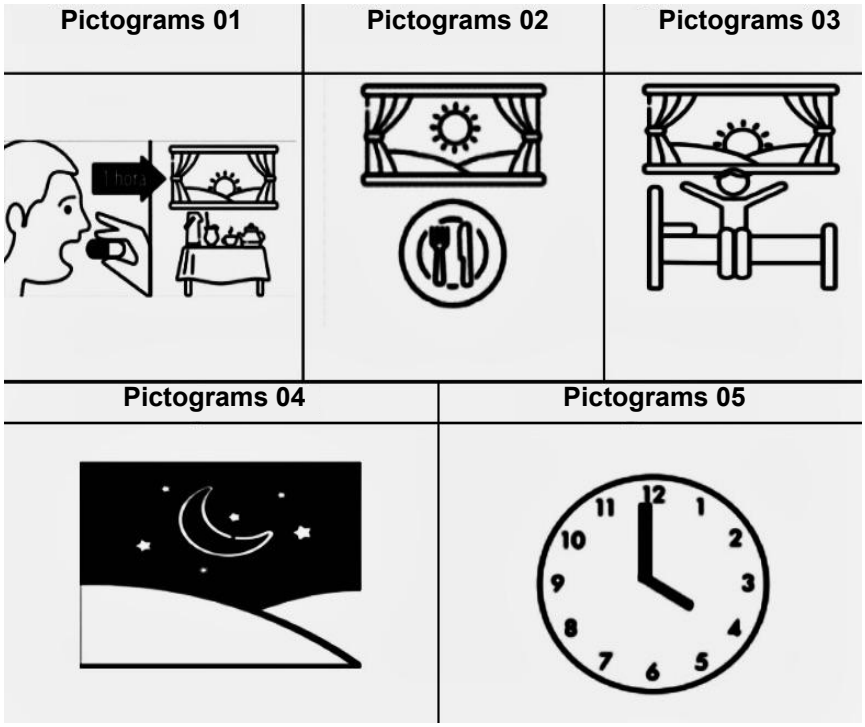

Figure 1 – Pictograms developed based on information collected from focus groups. Formigueiro, Rio Grande do Sul, Brazil, 2021.

Table II – Socioeconomic profile of users of the Brazilian Unified Health System served by a primary health care unit. Formigueiro, Rio Grande do Sul, Brazil, 2021.

Variable	Patients	
	n	%
Sex (N = 200)		
Male	70	35.0
Female	130	65.0
Age (N = 198)		
Young adult*	34	17.2
Middle-age**	67	33.8
Transitional phase***	62	31.3
Older adult****	35	17.7
Education (N = 25)		
Illiterate	03	1.5
1st to 4th grade	48	24.0
5th to 8th grade	52	26.0
High school	81	40.5
Higher education	12	6.0
Postgraduate	04	2.0
Income (in MW*#) (N = 198)		
Up to 1	71	35.9
1-3	99	50.0
4-6	18	9.1
7-9	01	0.5
More than 13	01	0.5
Does not know	08	4.0

Occupation (N = 199)		
Grupo 1+	21	10.6
Grupo 2++	48	24.1
Grupo 3+++	13	6.5
Grupo 4#	16	8.0
Grupo 5##	09	4.5
Retired	43	21.6
Homemaker	30	15.1
Unemployed	10	5.0
Other	09	4.5
Daily medication use (N = 200)		
None	56	28.0
1-3	112	56.0
4-6	22	11.0
7 or more	10	5.0

* Young adult: 15-30 years; ** Middle-aged: 31-45 years; *** Transitional phase: 46-60 years; **** Older adult: over 60 years; *#: MW (Minimum Wage): R$1,192.40. + Group 1: farm worker, subsistence farmer, rural laborer, animal breeder, beekeeper, fisherman; ++ Group 2: housekeeper, domestic worker, elderly caregiver, nanny, gardener, security guard; +++ Group 3: baker, bricklayer, painter, electrician, plumber, driver; # Group 4: teacher (elementary/high school, language, music, arts), technician (nursing, accounting, electronics, etc.), foreman, small business owner, self-employed worker; ## Group 5: physician, engineer, dentist, psychologist, economist, lawyer.
Source: Prepared by the authors.

The pictogram with the highest accuracy rate was number 4 (“Take at night”), correctly interpreted by 97.5% of participants. It was followed by pictogram number 2 (“Take with lunch” – 95.5%), number 5 (“Clock showing 4 o’clock” – 92.5%), and number 3 (“Take upon waking” – 90.5%). Pictogram 1 (“Take 1 hour before breakfast or chimarrão”) had the lowest accuracy rate (65%) and was not considered legible according to ISO 3864-1 criteria (Table III).

The main difficulties related to Pictogram 1 involved interpreting the timing and identifying the breakfast reference, along with vague answers or a lack of understanding from participants. The most common errors included confusion with morning medication use and unfamiliarity with the term chimarrão.

Table III – Comprehension of pictograms by users of the Brazilian Unified Health System at a primary health care unit (N = 200). Formigueiro, Rio Grande do Sul, Brazil, 2021.

Pictograms	Understood		Did not understand	
	n	%	n	%
Pictogram 1 “Take 1 hour before breakfast or chimarrão”	130	65.0	70	35.0
Pictogram 2 “Take with lunch”	191	95.5	09	4.5
Pictogram 3 “Take in the morning upon waking”	181	90.5	19	9.5
Pictogram 4 “Take at night”	195	97.5	05	2.5
Pictogram 5 “Clock showing 4 o’clock”	185	92.5	15	7.5

Source: Prepared by the authors.

In the analysis of the association between the number of correct responses and socioeconomic variables (Table IV), statistically significant results ($p < 0.05$) were observed for the variables education level, occupation, and number of daily medications used.

Table IV – Association between number of correct responses to pictograms and socioeconomic variables among users of the Brazilian Unified Health System. Formigueiro, Rio Grande do Sul, Brazil, 2021.

Variable	Correct answers – N (%)					p-value*
	01	02	03	04	05	%
Sex						
Male	02 (2,9)	02 (2,9)	02 (2,9)	27 (38,6)	37 (52,9)	
Female	00 (0)	04 (3,1)	13 (10)	35 (26,9)	78 (60)	
Total	02 (1)	06 (3)	15 (7,5)	62 (31)	115 (57,5)	0,056
Age						
Young adult*	00 (0)	01 (2,9)	04 (11,8)	09 (26,5)	20 (58,8)	
Middle-aged**	00 (0)	02 (3)	06 (9)	16 (23,9)	43 (64,2)	
Transitional phase***	01 (1,6)	03 (4,8)	03 (4,8)	20 (32,3)	35 (56,5)	
Older adult****	01 (2,9)	00 (0)	02 (5,7)	16 (45,7)	16 (45,7)	
Total	02 (1)	06 (3)	15 (7,6)	61 (30,8)	114 (57,6)	0,521
Education						
Illiterate	01 (33,3)	00 (0)	00 (0)	02 (66,7)	00 (0)	
1st–4th grade	01 (2,1)	01 (2,1)	03 (6,2)	21 (43,8)	22 (45,8)	
5th–8th grade	00 (0)	05 (9,6)	05 (9,6)	13 (25)	29 (55,8)	
High school	00 (0)	00 (0)	04 (4,9)	23 (28,4)	54 (66,7)	
Higher education	00 (0)	00 (0)	02 (16,7)	02 (16,7)	08 (66,7)	
Postgraduate	00 (0)	00 (0)	01 (25)	01 (25)	02 (50)	
Total	02 (1)	06 (3)	15 (7,5)	62 (31)	115 (57,5)	< 0,001
Income (in MW#)*						
Up to 1	00 (0)	01 (1,4)	02 (2,8)	22 (31)	46 (64,8)	
1-3	02 (2)	05 (5,1)	11 (11,1)	28 (28,3)	53 (53,50	
4-6	00 (0)	00 (0)	01 (5,6)	05 (27,8)	12 (66,7)	
7-9	00 (0)	00 (0)	00 (0)	00 (0)	01 (100)	
More than 13	00 (0)	00 (0)	00 (0)	01 (100)	00 (0)	
Does not know	00 (0)	00 (0)	00 (0)	05 (62,5)	03 (37,5)	
Total	02 (1)	06 (3)	14 (7,1)	61 (30,8)	115 (58,1)	0,653
Occupation						
Group 1+	00 (0)	02 (9,5)	01 (4,8)	09 (42,8)	09 (42,8)	
Group 2++	00 (0)	01 (2,1)	02 (4,2)	12 (25)	33 (68,7)	
Group 3+++	00 (0)	00 (0)	00 (0)	05 (38,5)	08 (61,5)	
Group 4#	00 (0)	00 (0)	01 (6,25)	02 (12,5)	13 (81,25)	
Group 5##	00 (0)	00 (0)	02 (22,22)	01 (11,11)	06 (66,66)	
Retired	02 (4,65)	00 (0)	02 (4,65)	20 (46,51)	19 (44,18)	
Homemaker	00 (0)	02 (6,7)	02 (6,7)	08 (26,7)	18 (60)	
Unemployed	00 (0)	01 (10,0)	05 (50,0)	02 (20,0)	02 (20,0)	
Other	00 (0)	00 (0)	00 (0)	02 (22,2)	07 (77,8)	
Total	02 (1)	06 (3)	15 (7,5)	61 (30,6)	115 (57,8)	0,001
Number of medications used daily						
None	0 (0)	2 (3,6)	8 (14,3)	15 (26,8)	31 (55,4)	
1-3	0 (0)	2 (1,8)	6 (5,4)	35 (31,2)	69 (61,6)	
4-6	2 (9,1)	1 (4,5)	1 (4,5)	06 (27,3)	12 (54,5)	
7 or more	0 (0)	1 (10)	0 (0)	06 (60)	03 (30)	
Total	2 (1)	6 (3)	15 (7,5)	62 (31)	115 (57,5)	0,005

* Young adult: 15-30 years; ** Middle-aged: 31-45 years; *** Transitional: 46-60 years; **** Older adult: over 60 years; *#: MW = Minimum Wage (R$1,192.40). + Group 1: farm worker, subsistence farmer, rural laborer, animal breeder, beekeeper, fisherman; ++ Group 2: housekeeper, domestic worker, elderly caregiver, nanny, gardener, security guard; +++ Group 3: baker, bricklayer, painter, electrician, plumber, driver; # Group 4: teacher (elementary, high school, language, arts), technician (nursing, accounting, electronics, etc.), foreman, small business owner, self-employed; ## Group 5: physician, engineer, dentist, psychologist, economist, lawyer
Source: Prepared by the authors.

DISCUSSION

This study aimed to propose the creation and validation of pictograms to improve the understanding of medical prescriptions by users of the SUS, considering local cultural and sociodemographic characteristics. One important cultural aspect identified during the focus groups was the regional habit of consuming chimarrão, which is typical of Southern Brazil. This element was incorporated into 1 of the pictograms to enhance user identification with the visual messages.

SUS users suggested more graphic and numerical elements than health professionals. This difference may be related to the groups' educational levels and technical knowledge, which influence how they interpret and construct visual information[11]. This highlights the importance of validating educational materials with the target audience to ensure linguistic and communicative appropriateness[12].

By relying on familiar symbols, pictograms promote the association of medical concepts with everyday images, facilitating information decoding — especially in contexts of low health literacy[13]. The visual representation of familiar situations enhances the effectiveness of instructions, transforming technical messages into clear and understandable guidance.

The predominance of female participants in the legibility study reflects a well-established pattern in the literature: women are more likely to seek health care services, both for their own needs and when caring for family members, especially children and older adults[1]. This higher female participation is associated with greater symptom awareness and a stronger sense of responsibility for self-care and caregiving.

Regarding age, most participants were middle-aged adults, a group more likely to experience chronic conditions and, therefore, higher medication use. This behavior may also reflect a pursuit of autonomy in health management, which tends to increase with aging and longer life expectancy[14]. Additionally, young adults and women often access services for reproductive health or childcare-related needs[15].

Although the sample had a relatively high level of education, it is important to consider that many SUS users also have private health insurance but continue to use public services due to accessibility or coverage limitations[16]. According to the National Supplementary Health Agency, this trend is seen even among individuals with higher education[17], reinforcing the need for universal communication strategies such as pictograms.

On the other hand, the sample also showed a predominance of occupations typically associated with lower formal education, such as domestic workers, cooks, security guards, janitors, and retirees. This may suggest progress in access to formal education even among socioeconomically disadvantaged groups — though it does not eliminate the need for materials that are accessible to all literacy levels.

The frequent use of multiple medications among participants aligns with the high prevalence of chronic diseases such as hypertension and diabetes. As the number of medications increases, so does the risk of self-medication, dosing errors, and improper storage, which can compromise the effectiveness and safety of treatment[19],[20].

In terms of legibility, only 1 pictogram failed to meet ISO 3864-1 standards.[9] Pictogram 1 had the highest number of errors, likely due to the challenge of conveying multiple pieces of information in a single image. Previous studies have emphasized that effective pictograms should be simple, convey only 1 visual concept, and be easily interpreted[21,22].

Overall, pictogram comprehension was significantly associated with education level, occupation, and number of medications used. Cruzeta et al.[23] noted that individuals with higher education levels tend to interpret medical prescriptions more accurately. However, the analysis in this study indicates that even among occupations requiring less formal education, pictogram comprehension was high — demonstrating their broad applicability[26].

Furthermore, combining pictograms with verbal instructions proved to be a promising strategy to increase medication adherence, with the potential to promote rational medicine use, reduce errors, and support the sustainability of public health care systems[5,13,26].

CONCLUSION

The methodology adopted through focus groups and interviews proved effective for the development of culturally appropriate and easily understood pictograms. Of the 5 pictograms tested, 4 met the legibility criteria established by ISO 3864-1, and comprehension was significantly associated with education level, occupation, and the number of medications used daily.

The incorporation of pictograms as a complement to verbal guidance may enhance treatment adherence and prescription understanding, thereby reinforcing the rational use of medications. However, further studies with larger and more diverse samples are recommended to refine and adapt the images to the real needs of the Brazilian population.

CONFLICTS OF INTEREST

All authors declare that they have no affiliations or involvement with any organization or entity — financial or non-financial — that could be perceived as a conflict of interest with the subject matter discussed in this manuscript.

AUTHOR CONTRIBUTIONS

Wagner Naysinger Alves contributed to the study design and planning. **Antônio Flores de Castro**, **João Víctor de Lara Brum Pedroso**, and **Camila Sales Fagundes** contributed to data collection, analysis, and interpretation. **Valéria Maria Limberger Bayer** contributed to writing and/or reviewing the manuscript.

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