

## Authorreferated knowledge and behavior on disposal of domiciliary medicines

Conhecimento e comportamento autorreferidos sobre descarte domiciliar de medicamentos

Conocimiento y comportamiento autorreferidos sobre descarte domiciliar de medicamentos

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### ABSTRACT

**Objective:** To analyze the self-reported knowledge and behavior on the disposal of medicines. **Method:** A cross-sectional study with data collected through a questionnaire in May 2017, in the city of Picos-PI, with a sample of 153 residences. **Results:** Regarding the self-reported knowledge, 139 (90.8%) stated that they had knowledge about environmental risk, 144 (94.1%) reported having no knowledge of the appropriate disposal site. 104 (68.0%) admit that the way they dispose of medicines in the environment poses some individual risk and 118 (77.1%) perceive the existence of a collective risk. Regarding the behavior, 107 (69.9%) stated that they had discarded medication due to the fact that the expiration date had expired, and the majority stated that they disposed of 124 (81.0%) in the original packaging and household waste. **Conclusion:** Self-reported knowledge and behavior demonstrate fragilities that compromise public and environmental health.

**Descriptors:** Pharmaceutical preparations, Waste management, Environmental pollutant.

### RESUMO

**Objetivo:** Analisar o conhecimento e comportamento autorreferidos sobre o descarte domiciliar de medicamentos. **Método:** Estudo transversal tipo *survey*, com dados coletados por meio de um questionário em maio de 2017, na cidade de Picos-PI, com amostra de 153 residências. **Resultados:** Sobre o conhecimento autorreferido, apesar de 139 (90,8%) afirmarem ter ciência sobre o risco ambiental, 144 (94,1%) relataram não ter conhecimento sobre local adequado de realizar o descarte, 104 (68,0%) admitiram que o modo como descarta os medicamentos no ambiente traz algum risco individual e 118 (77,1%) perceberam a existência de risco coletivo. Quanto ao comportamento, 107 (69,9%) afirmaram já ter descartado medicamento devido ao fato do prazo de validade vencido, e a maioria afirmou

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realizar o descarte dentro da embalagem original e no lixo doméstico, 124 (81,0%). **Conclusão:** O conhecimento e comportamento autorreferidos demonstram fragilidades que comprometem a saúde pública e ambiental. **Descritores:** Preparações farmacêuticas, Gerenciamento de resíduos, Poluição ambiental.

## RESUMEN

**Objetivo:** Analizar el conocimiento y el comportamiento autorreferidos sobre el descarte domiciliario de medicamentos. **Método:** Estudio transversal tipo survey, con datos recogidos por medio de un cuestionario en mayo de 2017, en la ciudad de Picos-PI, con muestra de 153 residencias. **Resultados:** Sobre el conocimiento autorreferido a pesar de 139 (90,8%) afirmar tener ciencia sobre el riesgo ambiental, 144 (94,1%) relató no tener conocimiento sobre el lugar adecuado de realizar el descarte. (68,0%) admite que el modo en que descarta los medicamentos en el ambiente trae algún riesgo individual y 118 (77,1%) percibe la existencia de riesgo colectivo. En cuanto al comportamiento, 107 (69,9%) afirmaron ya haber descartado medicamento debido al hecho del plazo de validez vencido, y la mayoría afirmó realizar el descarte dentro del embalaje original y en la basura doméstica, 124 (81,0%). **Conclusión:** El conocimiento y comportamiento autorreferidos demuestran fragilidades que comprometen la salud pública y ambiental.

**Descriptor:** Preparaciones farmacêuticas, Administración de resíduos, Contaminación ambiental.

## INTRODUCTION

The development of pharmaceuticals has made important advances in health care activities, since the drugs are a widely used and widely used technology, ranging from prevention to curing diseases. However, the exponential growth of the pharmaceutical market, coupled with a healthcare model that has roots focused on the treatment of diseases, has made the use of drugs progressive and often abusive.<sup>1</sup>

In this sense, some factors of consumption incentive, such as self-medication and the easy acquisition of drugs, generate in small Brazilian households "home pharmacies", which will generate leftovers of drugs that are probably no longer used, but which are stored until expiration of its expiration date, and consecutively despised in the most diverse places.<sup>2</sup>

In order to highlight the magnitude of the problem of this type of disposal, it is estimated that 20% of the drugs purchased have their final destination, the disposal with household waste or common sewage, which can be considered a worrying fact, depending on the degree of toxicity, these drugs can contaminate the environment.<sup>1</sup>

The Resolution from the *Resolução da Diretoria Colegiada (RDC)* [Collegiate Board of Directors] No. 306/2004 of the *Agência Nacional de Vigilância Sanitária (ANVISA)* [National Agency of Sanitary Surveillance] emphasizes as main objective that the planning of segregation and treatment of this type of waste must take into account the reduction of risks to the environment and public health.<sup>3</sup> Nevertheless, there is no regulation or program in Brazil that determines the collection of overdue medicines in the residences, and by convention the reverse logistics system is used, which places the producer as having the legal responsibility for the disposal.<sup>4</sup>

It is also important to highlight that besides the technical, symbolic, economic and political dimensions that involve

the drugs, these can also be configured as an important environmental issue, due to the organic contaminants originating from the residues that are generated from their disposal inadequate.<sup>1</sup>

Given the aforementioned, the following is asked: How is performed the household drug disposal in an urban area territory from the *Picos city/Piauí State*?

The research is justified because the environmental damage caused by the bioaccumulation of the residues of randomly discarded drugs are potentially serious, since the chemical effects of these substances can contaminate the ecosystem, and thus the human being either indirectly or directly by accidental exposure. The study's goal was to analyze the self-reported knowledge and behavior with regards to domiciliary medicines disposal.

## METHODS

This is a cross-sectional study of the survey type.<sup>5,6</sup> It was carried out in a residential neighborhood, located in *Picos city*, South-central region of the *Piauí State*. The choice of the neighborhood was due to the presence of two waste recycling centers, installed near the well that supplies the population with potable water and the fact that the waste destined to the recycling is conditioned in a shed without the adequate structure, being the same exposed to clear sky.

It was adopted as a population the total of records found in the Domiciliary and Territorial Record of the e-SUS strategy from the Basic Health Unit (BHU) of the referred district, where there are 348 residences registered. Therefore, the total population was 348 households. In order to calculate the sample size, the formula for cross-sectional studies with finite population was used as parameter, considering a 5% sampling error and a 95% confidence level, thus totaling 153 households as required to guarantee data fidelity.

Included in the study were domiciles inhabited by at least one resident and who had a home pharmacy. Households that were not the resident's permanent residence were excluded, and residences were rejected where residents were only present during school or vacation periods.

Data collection occurred in May 2017 through the following methodological steps:

1° - SITUATIONAL DIAGNOSIS: records of household records were requested from the Referral Health Unit of the neighborhood to establish the territorial referencing of the places where the researchers applied the instruments of the study;

2° - DOMICILE RANDOMIZATION: all numbers were assigned numbers ranging from 1 to 348. Consequently, the numbered chips were randomly drawn using the random number generator application: Random Number Generation;

3° - USING THE COLLECTION INSTRUMENTS: the researchers applied the questionnaires to the family member responsible for the organization of the residence and explained the objectives, risks and benefits of the research, requested the signing of the Free and Informed Consent Term, and finally the response to the data collection instrument. The questionnaire was composed of questions related to socio-demographic

and economic characterization, as well as the self-reported knowledge and behavior regarding the medicine disposal.

For data processing and analysis, Microsoft Excel 2010 software was used. The descriptive analysis was done by calculating the absolute and relative frequencies of the studied variables.

All the information and procedures were carried out according to the Resolution No. 466/12 from the National Health Council,<sup>7</sup> and the research was approved by the Ethics Committee from the *Universidade Federal do Piauí* under the *Certificado de Apresentação para Apreciação Ética (CAAE)* [Certificate of Presentation for Ethical Appraisal] No. 60084316.7.0000.8057.

## RESULTS

The use of home-based drugs raises the need for the organization of a support system that can meet the demands generated from the moment when the need to dispose of these substances arises. In this sense, it is imperative to know the types of drugs that are discarded and the individual, collective and environmental conditions that are involved in this practice.

Considering the total number of respondents, 107 (69.9%) were female, with a predominant age group of 60 (39.2%) people over 50 years old, 93 (60.8%) of the respondents stated that they were married or common-law marriage. Concerning the educational level, 53 (34.6%) stated that they had completed high school/incomplete higher education. Similar percentage 52 (33.9%) of the sample revealed to have attended to complete elementary school 2/incomplete high school. The prevalent family income in the sample varied between R\$ 937.00 and R\$ 2,811.00, in other words, between one and three minimum wages, according to **Table 1**.

**Table 1** - Social and Demographic Activities of the Sample. *Picos city/Piauí State, 2017.*

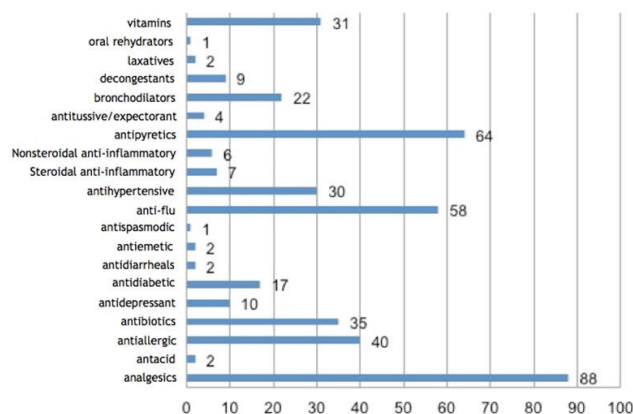
| Variable                                      | n   | %     |
|-----------------------------------------------|-----|-------|
| <b>1. Gender</b>                              |     |       |
| Female                                        | 107 | 69.9% |
| Male                                          | 46  | 30.1% |
| <b>2. Age group</b>                           |     |       |
| 18-25 years old                               | 10  | 6.5%  |
| 26-33 years old                               | 30  | 19.6% |
| 34-41 years old                               | 27  | 17.6% |
| 42-49 years old                               | 26  | 17.1% |
| > 50 years old                                | 60  | 39.2% |
| <b>3. Marital status</b>                      |     |       |
| Married / common-law marriage                 | 93  | 60.8% |
| Single                                        | 47  | 30.7% |
| Widow                                         | 13  | 8.5%  |
| <b>4. Education</b>                           |     |       |
| Kindergarten / incomplete elementary school 1 | 11  | 7.2%  |

| Variable                                                        | n   | %     |
|-----------------------------------------------------------------|-----|-------|
| Complete elementary school 1/<br>incomplete elementary school 2 | 35  | 22.8% |
| Complete elementary school 2 /<br>incomplete high school        | 52  | 33.9% |
| Complete high school / incomplete<br>college                    | 53  | 34.6% |
| Complete college                                                | 13  | 8.5%  |
| <b>5. Residing</b>                                              |     |       |
| First degree family / second degree<br>family, except parents   | 125 | 81.7% |
| Parents                                                         | 11  | 7.2%  |
| Alone                                                           | 08  | 5.2%  |
| Partner                                                         | 05  | 3.2%  |
| Friend                                                          | 04  | 2.7%  |
| <b>6. Number of people at home</b>                              |     |       |
| 1- 2 people                                                     | 47  | 30.7% |
| 3 - 5 people                                                    | 93  | 60.8% |
| > 5 people                                                      | 13  | 8.5%  |

Source: Field research.

Regarding the absolute frequency of household waste disposal, the three most commonly mentioned pharmacological classes were, respectively, analgesics, antipyretics, and anti-flu, with a frequency of 88, 64 and 58, respectively (**Figure 1**).

**Figure 1** - Graphical presentation of the household disposal frequency of medicines according to the pharmaceutical class. *Picos city/Piauí State, 2017.*



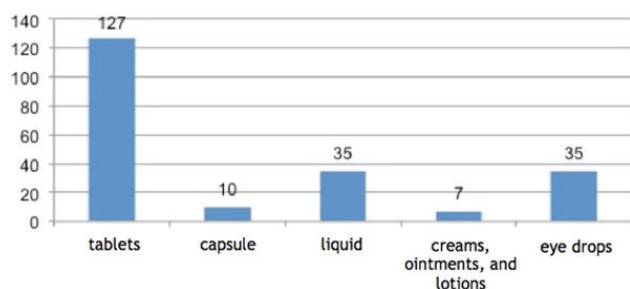
Fonte: Pesquisa de campo.

\*It was considered that more than one pharmacological class could be mentioned by the individual in the sample.

Based on the pharmacological class, the following statistical standards were calculated: average ( $\bar{x}=3$ ), which corresponded to three types of distinct pharmacological classes discarded by domicile; mode ( $Md=1$ ), with only one pharmacological group discarded in the majority of households; and standard deviation ( $SD\pm 1.87$ ), which guarantees low dispersion of the presented data.

Observing the household disposal of medicines according to their respective pharmaceutical forms, the tablets surpassed the other forms, being cited 127 times. The creams, ointments, and lotions were the ones with the lowest number of mentions (**Figure 2**).

**Figure 2** - Graphical presentation of the household disposal frequency of medicines according to the pharmaceutical form. *Picos city/Piauí State, 2017.*



Source: Field research.

\*It was considered that more than one pharmacological class could be mentioned by the individual in the sample.

When asked about the appropriate place to dispose of medicines that are no longer used, 144 (94.1%) people said they did not have this knowledge. Nonetheless, 139 (90.8%) of the sample believe that there is some risk to the environment due to the way they discard the drugs.

In the same perspective, 104 (68.0%) have admitted that the way they waste medicines in the environment may produce some individual risk and 118 (77.1%) perceive the existence of a collective risk. In relation to having already received some kind of information about the adequate disposal of medicines at home, 137 (89.5%) of the individuals interviewed stated that they did not (Table 2).

**Table 2** - Self-reported knowledge with regards to domiciliary medicines disposal. *Picos city/Piauí State, 2017.*

| Variable                                                                                    | n   | %     |
|---------------------------------------------------------------------------------------------|-----|-------|
| <b>1. Knowledge of appropriate disposal location</b>                                        |     |       |
| No                                                                                          | 144 | 94.1% |
| Yes                                                                                         | 09  | 5.9%  |
| <b>2. Environment hazard</b>                                                                |     |       |
| Yes                                                                                         | 139 | 90.8% |
| No                                                                                          | 14  | 9.2%  |
| <b>3. Individual risk</b>                                                                   |     |       |
| Yes                                                                                         | 104 | 68.0% |
| No                                                                                          | 49  | 32.0% |
| <b>4. Community risk</b>                                                                    |     |       |
| Yes                                                                                         | 118 | 77.1% |
| No                                                                                          | 35  | 22.9% |
| <b>5. Have you received information about the appropriate disposal of medicines at home</b> |     |       |
| No                                                                                          | 137 | 89.5% |
| Yes                                                                                         | 16  | 10.5% |

Source: Field research.

In the present investigation, 107 (69.9%) members of the sample reported having already discarded medication due to the fact that they were expired. Moreover, the majority stated that the drugs were disposed in their original packaging directly into the household waste, 124 (81.0%) and 140 (91.5%), respectively. (Table 3)

**Table 3** - Self-reported behavior with regards to domiciliary medicines disposal. *Picos city/Piauí State, 2017.*

| Variable                                                           | n   | %     |
|--------------------------------------------------------------------|-----|-------|
| <b>1. Medicinal product discarded based on the expiration date</b> |     |       |
| Yes                                                                | 107 | 69.9% |
| No                                                                 | 46  | 30.1% |
| <b>2. Method of disposal</b>                                       |     |       |
| Inside the original packaging                                      | 124 | 81.0% |
| Crushed                                                            | 03  | 2.0%  |
| Diluted                                                            | 07  | 4.5%  |
| Hard container                                                     | 05  | 3.3%  |
| Does not observe this aspect                                       | 14  | 9.2%  |
| <b>3. Place of disposal</b>                                        |     |       |
| Domestic waste                                                     | 140 | 91.5% |
| Domestic sewage                                                    | 07  | 4.5%  |
| Wasteland                                                          | 03  | 2.0%  |
| BHU                                                                | 03  | 2.0%  |
| <b>4. Presence of a suitable public place for disposal</b>         |     |       |
| No                                                                 | 142 | 92.8% |
| Yes                                                                | 11  | 7.2%  |

Source: Field research.

According to the results, in the neighborhood investigated it is possible to perceive the potential risk of environmental contamination, which can lead to countless public health problems, in addition to individual and collective hazards. It should be noted that it is important to point out that the two waste recycling centers in the neighborhood do not have an adequate structure for the packaging and treatment of these wastes and that they were installed near the well that supplies the community's drinking water supply.

## DISCUSSION

A The use of drugs is a practice that is becoming increasingly consolidated in the contemporary world since the culture of medicalization and the technological strengthening of the pharmaceutical industry encourage people to use these substances often in an irrational way.<sup>8</sup> On the other hand, another vehement problem is that the management of waste generated from this growing use is not fully considered in public health policies and programs, which generates imbalances in individual, collective and environmental environments.

At least one drug disposal episode was reported in all residences visited. This characteristic is explained by evoking the "pill culture", which is one of the outstanding cultural characteristics of the Brazilian population, strengthened by the easy acquisition of medicines and by the mistaken idea of seeing the medicine as an essential source for the healing and/or health process.<sup>9</sup>

A significant portion of the sample stated that they did not know about the appropriate place for the disposal of medicines that are no longer used even though they are

aware that there is some risk to the environment due to the way in which they are disposed. This demonstrates the lack of actions of Health Education by health professionals working in that locality, especially those that are part of the Family Health Strategy, since this type of activity is part of its attributions and is configured as an important tool to improve the population's understanding of the health-disease process, offering subsidies for the adoption of new habits and behaviors that positively interfere in that local reality.

The high frequency of analgesics cited in this study can be explained by the fact that this pharmacological class is widely used for self-medication, since pain is the main symptom presented by different health conditions.<sup>10</sup> Furthermore, they are easy to acquire and, to a large extent, have a free sale, then requiring no prescription.<sup>11</sup>

There is a need for the population to understand that it is also a key part of the search for and implementation of solutions to the problems caused by the inappropriate disposal of medicines in the environment.<sup>12</sup>

This requires attention to actions aimed at educating the population about the rational use of medicines and that it needs to be aware of some peculiarities, such as the shelf life.<sup>2</sup>

Neglecting overdue medicines in the common garbage is a multifactorial problem that needs attention and joint action among governments, companies, entities, and society. In this context, Brazil is the seventh country in the world in the sale of medicines, with around 70,400 pharmacies and, according to the estimates of the *Agência Brasileira de Desenvolvimento Industrial (ABDI)* [Brazilian Industrial Development Agency], discards more than 10.3 tons per year of residues in drugs.<sup>13,14</sup>

Although there is no specific legislation on the destination of overdue and/or unused drugs found in homes, Resolution No. 44 of August 17<sup>th</sup>, 2009, provides in article 93 that pharmacies and drugstores are allowed to participate in collection programs of medicines to be discarded by the community in order to preserve public health and the quality of the environment.<sup>15</sup> However, despite being a viable idea, there is no specific legislation that obliges these establishments to carry out these campaigns.<sup>16</sup>

Another possibility for the destination of these drugs would be incineration since it is quite effective as it promotes the inactivation of the active principles.<sup>17</sup> Nevertheless, in order to maintain environmental safety conditions, the companies responsible for this type of service must be endowed with sophisticated systems and constant treatment of gaseous and liquid effluents.<sup>18</sup>

Hence, solutions to the problem of inappropriate disposal of medicines in the environment need educational, preventive and supervision actions, whose planning and execution demand the involvement and, above all, the commitment of the various actors and social and governmental entities, aiming at the protection of the environment to promote health for the population.

## CONCLUSIONS

Herein, it was possible to show that self-reported knowledge and behavior demonstrate vulnerabilities that compromise both public and environmental health. This demonstrates that there is a real and urgent need to implement public policies that deal exclusively with this issue.

As limitations of the study, it is worth noting that only one resident of each household was interviewed, in other words, the actual percentage of drug disposal in that community may be much higher than that presented here.

The study makes possible relevant results, pioneering and above all, very worrisome, since it was noticed the environmental hazard present in the community investigated. This evidences the need for measures taken by the sanitary and environmental authorities regarding the control and inspection of the recyclable waste deposits, implanted in the neighborhood, which has been investigated.

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